July 17, 1928. 1,677,537

W. S. WERNER

ELECTRIC TRANSFORMER

Filed June 2, 1921 3 Sheets-Sheet 1

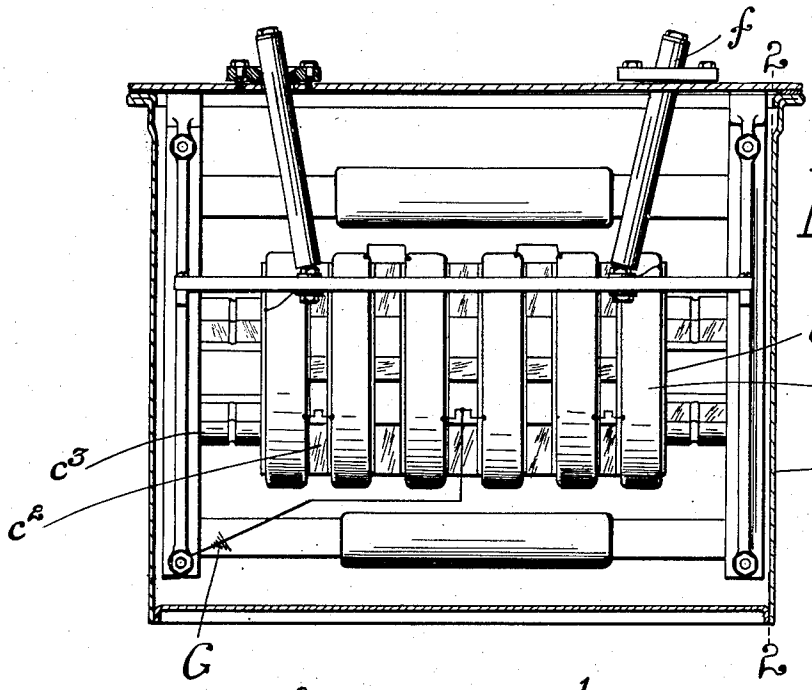


Fig. 1

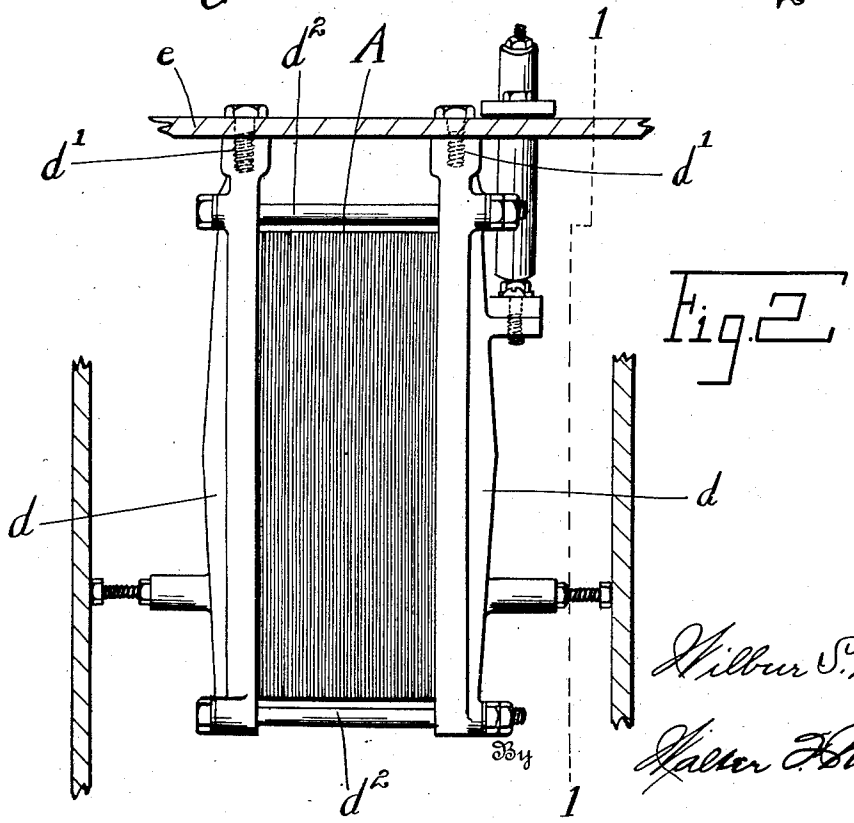


Fig. 2

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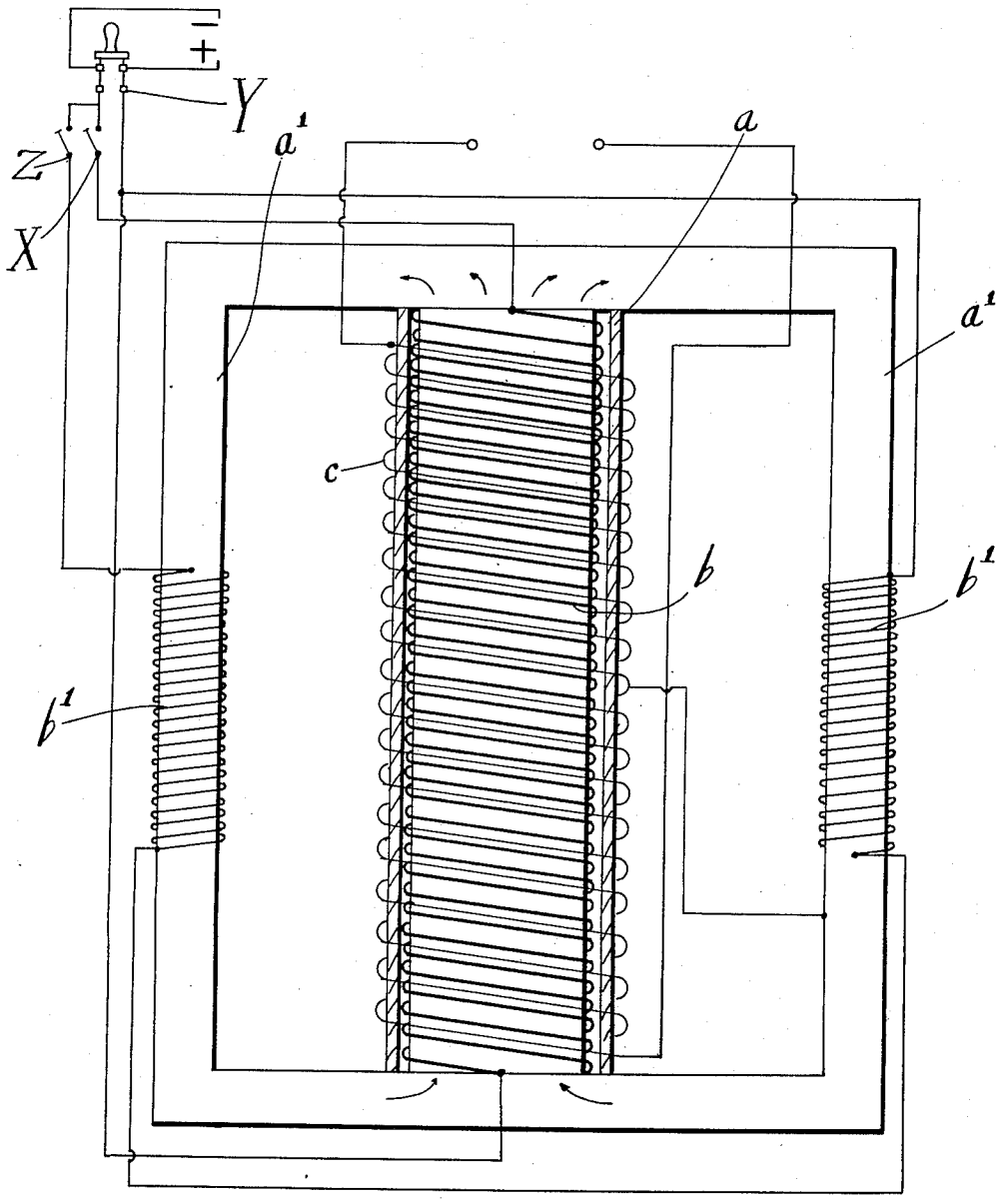


Fig. 3

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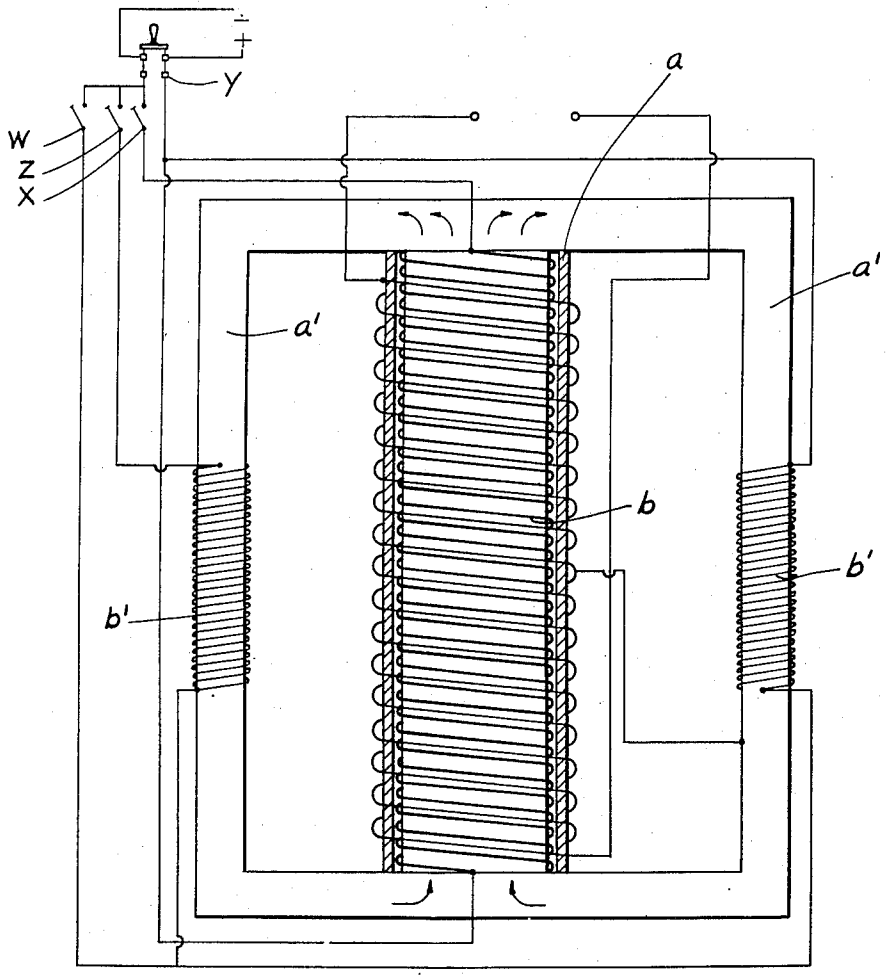


FIG. 4

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Patented July 17, 1928. 1,677,537

UNITED STATES PATENT OFFICE.

WILBUR S. WERNER, OF COVINGTON, KENTUCKY, ASSIGNOR TO THE KELLEY-KOETT MANUFACTURING COMPANY, OF COVINGTON, KENTUCKY, A CORPORATION OF KENTUCKY.

ELECTRIC TRANSFORMER.

Application filed June 2, 1921. Serial No. 474,440.

An object of my invention is to provide a transformer adapted to produce high tension currents of same or different voltage, but of dissimilar kilovolt ampere output, (or, as it is commonly termed kva. output) from a given secondary or high tension winding and given primaries of low tension current.

Another object is to provide a transformer for the purpose stated wherein the magnetic flux in the core may be made the resultant of a plurality of primary windings, wherefore the kva. output of the induced current may be varied in direct relation to the resultant flux.

Another object is to provide a compact transformer for the purposes stated that is simple in construction and operation.

These and other objects are attained by the means described herein and disclosed in the accompanying drawings, in which

Fig. 1 is a sectional view on line 1—1 of Fig. 2.

Fig. 2 is a sectional view on line 2—2 of Fig. 1.

Fig 3 is a diagrammatic view of the locations of the windings of the transformer.

Fig. 4 shows a modified wiring diagram for the device of the invention.

My invention comprises a core A having a main or body portion *a* adapted to extend through a secondary winding C and having branches *a'* adapted to lie outside of the secondary winding. A main primary winding *b* is provided for the center or body portion of the core adapted to extend through the secondary windings C, and auxiliary primary windings *b'* are provided for the arms of the core. The main primary winding, or in other words, the winding contained interiorly of the secondary windings is adapted to be embraced within a primary circuit independent of and to the exclusion of the auxiliary primary winding. In like manner the auxiliary primary windings may be embraced in a closed circuit without sending any of the current through the main primary winding. By employing these series of primary windings, it is possible to vary the intensity of the magnetic flux through the core, wherefore it is possible to vary the kva. ouput of the high tension current created in the secondary winding.

The core A is built up of a series of laminations having substantially the figure of the numeral 8. The main or center portion *a* of the core has wound upon it a main primary winding *b*, as is common in the art. The arms *a'* of the core have wound about them the auxiliary primary windings *b'*. When the main primary winding *b* is embraced within a closed circuit, the magnetic flux follows the arrows shown in Fig. 3, being strongest in the center portion of the core, the arms *a'* completing the path whereby the lines of force pass from and between the opposite poles of the magnet developed in the center portion *a* of the core. When the auxiliary windings *b'* are embraced within a closed circuit, the arms *a'* become the magnets which effect the secondary windings, and the center portion *a* of the core provides a path whereby the lines of force may extend in continuity between the poles of the magnets into which the arms *a'* are developed. The windings *b'* are preferably in such direction that the magnetic flux will follow the same path as when the main primary winding is employed to develop the center portion *a* into a magnet, wherefore the auxiliary primary windings are developed into co-operative forces in magnetizing the center portion of the core and in setting up lines of force inducing the secondary current.

The secondary windings comprise a series of units *c* extending around the center portion *a* of the core and the main primary winding *b*. The units *c* are connected in series. The units *c* are disposed intermediate the auxiliary primary windings *b'* upon the arms *a'*. The units *c* are spaced and are retained in spaced relation by means of fiber washers *c'* mounted on each side of each unit, and by means of insulating blocks c^2 disposed intermediate the adjacent washers *c'*. The end units are spaced from the ends of the core by means of insulating blocks c^3. The laminations of the core A are secured upon one another by the end clamps *d* having threaded sockets *d'* formed upon their upper ends. The end clamps on each end of the core A are positioned and secured upon the core by means of the bolts d^2. The core A, together with the windings thereon, is adapted to be mounted upon the top or cover *e* of a casing E, and to be suspended interiorly of the casing E. The casing E contains oil in sufficient quantity that the primary and secondary coils are immersed

therein. The terminals of the several windings extend through the cover *e*. The conductors leading from the secondary windings are preferably insulated by means of mica tubing *f*.

The operation of my device is as follows. Reference is made to Fig. 3.

The transformer is connected to a suitable source of alternating current.

When current is directed through the main primary winding *b* by way of suitable switches, and the terminals X and Y, the core *a* attains its maximum strength as a magnet and an induced current of the maximum kva. output is created in the secondary windings as is common in the art.

When a similar current is directed through the auxiliary primary windings *b'* by way of a suitable switch and the contacts Y and Z, the core *a* is magnetized to a lesser extent than when the main primary winding is embraced in the circuit, and an induced current of a lower kva. output is set up in the secondary coils. The relative kva. output of the currents set up in the secondary coils by the excitation of the main primary winding and the auxiliary primary windings is determined by the relative winding in these two primary windings, provided the primary current is constant. It is possible to wire all the primary windings, in parallel, and in different combinations, from all which various secondary currents may be induced, for example as shown in Fig. 4 wherein the simple addition of another switch "W" attains such result. Also the primary windings may be connected in series whereby different combinations will induce a current of other capacities. The voltages will, of course, be also determined by the number of windings, etc.

From the foregoing it is readily apparent that the number of arms *a'* may be varied and that the relative windings on the arms may be carried, whereby it is possible to employ the same secondary winding, and yet produce high tensioned currents of various capacities therefrom. The secondary winding is preferably grounded upon the core at G. The core in turn is grounded.

What I claim is:

1. In a transformer the combination of a core having a body and branches, a main primary winding on the body and an auxiliary primary winding on each of the branches, a secondary winding about the body of the core intermediate the branches, and a switch adapted to selectively connect the primary windings with a primary electrical circuit.

2. In a transformer the combination of a main core, a branch core extending in magnetic continuity from the main core, a primary winding on the main core, a primary winding on the branch core, a secondary winding about the main core and extending intermediate the main core and the branch core, and a switch adapted to direct a current through either primary winding.

3. In a transformer, the combination of a main core, a branch core in magnetic continuity with the main core, a primary winding on the main core, a primary winding on the branch core, a single secondary winding about the primary winding about the main core and extending intermediate the branch and main cores and switch means for jointly and severally connecting the primary windings to a primary electrical circuit.

In testimony whereof, I have hereunto subscribed my name this 31st day of May, 1921.

WILBUR S. WERNER.